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ABSTRACT

Parents have the wonderful opportunity and responsibility for nurturing children. This digest presents resources that will enable parents to fulfill their responsibility for developing their children's abilities to do mathematics, while at the same time encouraging more positive attitudes towards mathematics. The resources are divided into three areas: (1) activities initiated in the home, (2) activities initiated at school, and (3) special curriculum development projects that promote parent involvement. (Includes 22 references.) (MKR)

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ERIC/CSMEE DIGEST

Doing Mathematics with Your Child

by
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Doing Mathematics with Your Child

Martin D. Hartog & Patricia A. Brosnan

Parents have the wonderful opportunity and responsibility for nurturing children. This nurturing process takes place in several areas of development: physical, emotional, and intellectual. While parents can usually find time to read a story to their children, thereby instilling a love for literature, they are often at a loss as to how to instill a love and appreciation for mathematics.

Like reading, mathematics is a subject that is indeed necessary for functioning adequately in society. More than that, mathematics is a subject that should be more enjoyable than it sometimes is. The National Council of Teachers of Mathematics (NCTM) has identified the appreciation and enjoyment of mathematics as one of the national goals for mathematics education. This goal, coupled with the task of nurturing children's confidence in their ability to apply their mathematical knowledge to solve real-life problems, is a challenge facing every parent today.

This digest presents resources that will enable parents to fulfill their responsibility for developing their children's abilities to do mathematics, while at the same time encouraging more positive attitudes toward mathematics. The resources are divided into three areas: (1) activities initiated in the home; (2) activities initiated at school; and (3) special curriculum development projects that promote parent involvement.

Activities in the Home

There are methods by which parents can easily become involved in their children's mathematics education. Several resources provide parents with games and activities that engage children in mathematical thinking and problem solving and, at the same time, build their self-confidence and appreciation for mathematics. An example of this type of resource is the book *Helping Your Child Learn Math*. Published by the U.S. Department of Education, the book contains 26 activities for children aged 5 to 13. The activities illustrate the mathematics that children can experience at home, at the grocery store, and while traveling. Some meaningful activities on a long car trip can alleviate the boredom that so often results in children fighting with each other or asking repeatedly, "Are we there yet?"

Parents' attitudes toward mathematics have an impact on children's attitudes. Children whose parents show an interest in and enthusiasm for mathematics around the home will be more likely to develop that enthusiasm themselves. *You Can Help Your Young Child Learn Mathematics*, available in both English and Spanish, helps parents communicate the importance of mathematics to their children and become more involved in their children's mathematical education. This book discusses ways that parents can help their children develop good study habits, and it presents activities through which families can make mathematics a part of their daily lives as they travel, cook, garden, and play games.

Reading to children is a treasured activity in many homes. What better way to integrate mathematics into the lives of children than to read them stories that bring mathematical ideas to life? Children's books related to mathematics can be separated into four categories: counting books, number books, storybooks, and concept books. A bibliography of 159 children's books that make a significant connection with mathematics, compiled by Stavroula K. Gailey and published in the January 1993 issue of the *Arithmetic Teacher*, provides many excellent suggestions for mathematical children's literature to read at home.

Math Matters: Kids Are Counting on You is a resource kit prepared by the National Parent Teacher Association for parents who feel inadequate in helping their children with mathematics. The kit's planning guide describes how local PTAs can use the kit to encourage elementary school parents to become more involved with their children's mathematics education. The kit contains the planning guide, a booklet with 70 suggested math activities for the home, a four-fold brochure summarizing the kit and its purpose, two posters, math stickers, and a 7-minute videotape about the role of parents in opening up opportunities for their children in mathematics.

Although more expensive and requiring extra equipment, technology can be utilized by parents to provide mathematical activities for their children. The best software packages are user friendly and highly interactive, and they offer problems that challenge both students and parents. One exemplary software is *The Factory* by WINGS. Available in both English and Spanish, this software simulates the operation of a factory production line and requires the user to solve problems involving flaws in production. Another potential resource is the public library, where mathematics videos and computer software are available for use at home or in the library.

Working With Your Child's Classroom Teacher

Besides the mathematics learning that takes place at the parent's initiative, there are many opportunities for parents and teachers to work cooperatively in enriching children's experience with mathematics. These situations are likely to be the most profitable for two reasons. First, children generally want to please both their parents and their teachers. If they see that mathematics is important to both their parents and their teacher, they will consider it important for themselves too. Second, extending mathematical concepts from the classroom to home will establish the idea that mathematics is not just a school subject, but an everyday subject that makes life more interesting and understandable.

Parents who want to become more involved in their child's mathematical education, but who are hesitant to take the initiative on their own, may want to look to the teacher for guidance. Teachers can provide assistance in: (1) setting up a system of home study; (2) helping parents understand the sequencing of mathematical skill development; (3) suggesting materials and activities that are entertaining and suitable for their child's level and which can be done in a reasonable amount of time; (4) providing clear guidelines on how to use materials; (5) giving feedback on the successes and failures of home activities; and (6) knowing when to stop working with a child on an activity so that a good working relationship is maintained.

Resources for this collaborative effort are myriad. For the elementary grades, the *Arithmetic Teacher* (recently renamed *Teaching Children Mathematics*) is a reliable resource for materials that establish the parent/teacher/student connection. Every month the "Ideas"

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section contains activities for grades K-8 and an activity for the home, all related to a common topic. Another example is the "Math Backpack," described in the February 1993 issue of the *Arithmetic Teacher*. The Math Backpack contains samples of activities that second-graders can do in their classroom, then take home and share with their parents. The backpacks familiarize parents with teaching techniques, give children an opportunity to demonstrate their understanding of mathematical concepts, and engage both parents and children in investigative activities. One backpack included activities for subtraction, pattern blocks, measurement, and telling time.

For the middle school level, a new journal published by NCTM, called *Mathematics Teaching in the Middle School*, features a "Menu of Problems," including appetizers (easy, motivational problems), main courses (robust, solid content problems), and desserts (challenging, intriguing problems). Another monthly feature is the "Mathematics Investigator," which focuses on uses and abuses of mathematics in the media.

In working with teachers, parents should not forget the opportunities that homework assignments offer. Studies have shown that parents' participation in students' homework can increase achievement. Moreover, the effect of that involvement will be maximized if parents and teachers work together toward common goals. It is important for parents to understand the system the teacher is using to assign and evaluate homework, as well as the methods being used to teach mathematical concepts. Helping children with homework can be counterproductive if parents are working at cross purposes with the classroom teacher.

Programs Promoting Parent Involvement

The professional mathematics education community is in the process of making changes in curriculum, instruction, assessment, and in the level of parent involvement. Over the past decade, increasing emphasis has been placed on the need to enhance children's problem-solving capabilities by teaching from a hands-on perspective. Teachers are being asked to incorporate manipulatives and technology into their instruction, and programs are being developed that incorporate parental involvement in reaching these goals.

Examples of such programs are *Family Math* and *Family Computers*, both developed by Project EQUALS to help parents teach their children mathematics. Besides providing learning activities that parents can do with their children, Project EQUALS provides information on equity issues in mathematics education, builds awareness of the importance of problem-solving skills and the ability to talk about mathematics, and helps parents develop a positive attitude toward their role in their children's mathematical education.

Programs often emerge from special needs. Many of the programs in the resource list below address the need to improve the participation and achievement of females and minorities in mathematics. All, however, stress the indispensable part that parents can play in nurturing success in mathematics for their children.

Mathematics Education Resources

The following items have been selected from ***PRIME: Parent Resources In Mathematics Education****, a longer annotated bibliography available for $1.95 from ERIC/CSMEE, 1929 Kenny Road, Columbus, OH 43210-1080.*

Parent Guides for Home Activities

Apelman, M., & King, J. (1989). *Pizzas, pennies and pumpkin seeds: Mathematical activities for parents and children.* Denver: Colorado State Department of Education. (ERIC Document Reproduction Service No. ED 327 395)

Arbanas, R. J., & Lindquist, G. R. (Eds.). (1989). *Girls + Math + Science = Choices: A handbook for parents.* Marshall, MI: Calhoun Intermediate School District. (ERIC Document Reproduction Service No. ED 313 245)

Ashlock, R. B. (1990). Parents can help children learn mathematics. *Arithmetic Teacher, 38*(3), 42-46.

Ford, M. S., & Crew, C. G. (1991). Table-top mathematics—A home-study program for early childhood. *Arithmetic Teacher, 38*(8), 6-12.

Gailey, S. K. (1993). The mathematics—children's—literature connection. *Arithmetic Teacher, 40*(5), 258-261.

Jacobs, J. W. (1989). Purr-r-r-fectly wild about mathematics. *Arithmetic Teacher, 37*(4), 4-5.

Kanter, P. F., & Dorfman, C. H. (Eds.). (1992). *Helping your child learn math with activities for children aged 5 through 13.* Washington, DC: U.S. Department of Education, Office of Educational Research and Improvement. (ERIC Document Reproduction Service No. ED 355 122)

National Parent Teacher Association. (1989). *Math matters: Kids are counting on you.* Chicago: The National PTA.

Office of Educational Research and Improvement. (1987). *Help your child learn math.* Washington, DC: U.S. Department of Education. (ERIC Document Reproduction Service No. ED 280 676)

Office of Educational Research and Improvement. (1993). *You can help your young child learn mathematics (Usted puede ayudar a sus hijos a aprender matbematicas).* Washington, DC: U.S. Department of Education. (ERIC Document Reproduction Service No. ED 356 974)

Tregaskis, O. (1991). Parents and mathematical games. *Arithmetic Teacher, 38*(7), 14-16.

Parent/Teacher Activities

Bruneau, O. J. (1988). Involving parents in the mathematics education of their young handicapped child. *Arithmetic Teacher, 36*(4), 16-18.

Flexer, R. J., & Topping, C. L. (1988). Mathematics on the home front. *Arithmetic Teacher, 36*(2), 12-19.

Goldstein, S., & Campbell, F. A. (1991). Parents: A ready resource. *Arithmetic Teacher, 38*(6), 124-127.

Orman, S. A. (1993). Mathematics backpacks: Making the home-school connection. *Arithmetic Teacher, 40*(6), 306-308

Programs for Parental Involvement

Anderson, L., & Stein, W. (1992). The American Indians in Mathematics Project (AIM). *Journal of Rural and Small Schools, 5*(2), 24-31.

Caldwell, J. (1989). Families tackle math as a game—together. *Equity and Choice, 5*(1), 21-23.

Goldberg, S. (1990). *Developing and implementing a parental awareness program to enhance children's mathematics performance and attitude.* Unpublished doctoral practicum, Nova University, Fort Lauderdale, Florida. (ERIC Document Reproduction Service No. ED 327 383)

Joseph, H. (1993). Teaching mathematics with technology: Build parental support for mathematics with family computers. *Arithmetic Teacher, 40*(7), 412-415.

Merttens, R., & Vass, J. (1990). *Sharing maths cultures: IMPACT (Inventing Maths for Parents and Children and Teachers).* Philadelphia: Falmer Press. (ERIC Document Reproduction Service No. ED 342 613)

O'Connell, S. R. (1992). Math pairs: Parents as partners. *Arithmetic Teacher, 40*(1), 10-12.

Project EQUALS. (19). *Family math.* Berkeley, CA: University of California, Lawrence Hall of Science.

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